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ABSTRACT

A large-scale study of Swedish men and women, each of whose intelligence level at age 13 was above the 25th percentile and whose father's education was only at the elementary level, was conducted in order to determine what educational level the participants had achieved and to study long-term effects of schooling. Subjects were sent questionnaires which were followed up by personal interviews with a subsection of the group. Questions included information about education, occupation and working conditions, spare time activities, social contacts, and confidence in own ability and competence. Most of the questions were geared to determine the effects of education on the areas mentioned above. Educational level was found to correlate with school satisfaction both positively and negatively (some of those at lower levels demanded more education for the younger generation than they obtained themselves). On the subject of work, respondents with higher educational levels were found to consider their jobs as learning experiences and felt they had more influence on their working conditions; at the lower levels, subjects' work was less demanding. Involvement in cultural activities correlated positively with educational level, and entertainment activities such as watching television or sport events were correlated negatively. Social contacts were greater with family at lower levels and greater with other workers at higher education levels. The relation between educational level and confidence in ability varied depending on the character of the task in question (practical, civic, or linguistic). The verbal interviews found that linguistic ability varied both by sex and education level. Included with this paper are tables providing information in graph form about the various questions. (CG)

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An empirical study of long term effects of education

Kjell Härnqvist

Paper given at the First International Conference on Education in the '90s: Equality, Equity and Excellence in Education
Tel-Aviv, Israel, 16-19 December 1984

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LING 7

Long term effects of education

An empirical study of long-term effects of education

Kjell Härnqvist, University of Göteborg

In 1975 Hyman, Wright and Reed published a book on The Enduring Effects of Education. In this book they reported secondary analyses of responses to knowledge questions in American public opinion polls among persons having reached different levels of education: elementary only, high school and college. On average the college graduates scored twice as high as the elementary school leavers and the high-school graduates were half-way between. These differences can be attributed to, at least, two kinds of influences. Self-selection, or selection by educational institutions, to different types and levels of education. And learning in school or in the occupations to which different types of education give entry.

In an address to the American Educational Research Association (Härnqvist, 1977) I discussed this and a few other studies that dealt with long-term effects of schooling. I also sketched a research project in relation to the model shown in Figure 1.

Figure 1

The model contains initial characteristics of the individuals before any differentiation of the school program; sorting and learning processes in school, both repeated for different numbers of cycles; and sorting and learning processes in occupational and social contexts. At each stage a positive correlation can be expected between entry characteristics and achievement. The adult level of knowledge, skills, attitudes etc. is influenced by all these processes.

In order to do empirical research according to this model it is necessary to use a panel or longitudinal design and apply it to a large and representative sample followed for such a long period that it covers both the differentiated part of education and preferably a few years after. And this is what we have been doing in the empirical study from which I now will report some results.

Data and procedure

In 1961 we started a longitudinal study of all pupils attending Swedish schools who were born on the 5th, 15th and 25th in any month of 1948. We obtained a ten percent sample of the 1948 birth cohort, altogether about 12 000 individuals, most of whom in the sixth grade of the compulsory school. The initial data collection included intelligence and achievement tests, school marks, interest and attitude surveys, and social background. In the present study intelligence and social background have been used as indicators of initial student characteristics.

The data bank has, through the years, been used for a large number of studies, both cross-sectional and longitudinal. A selected list of publications is found under References.

In 1980 a mail questionnaire was administered to three partially overlapping sub-samples of the original sample:

- all who had attended higher education,
- all born on the 15th in any month of 1948, i.e. one out of 30 in the birth cohort, and
- a specially selected group for which results will be reported here.

This group was preselected according to two criteria: intelligence at 13 above the 25th percentile, and father's education only elementary. Both criteria were used in order to get a group where the participants, at the age of 32, could be expected to be distributed over all levels of education: from elementary only to higher education. The lowest intelligence levels were excluded because of the low probability of finding persons with intermediate and higher education among them. "Educated" families were excluded because of the low probability of finding persons with only compulsory education in them. After this curtailment of the representative sample a factorial design was superimposed in a way that should guarantee persons in all cells for comparing levels of education with intelligence and social background under control.

The main variable under study, educational level, was divided into seven categories: from elementary only, through vocational or academic education at the junior high-school level, senior high-school of an academic type, to college and univer-

sity education. Intelligence was divided into three strata roughly corresponding to the scores 4-5, 6-7 and 8-9 on a 9-point standard (stanine) scale, 1-3 excluded as mentioned above. For social background two strata were used: workers, and salaried employees at lower levels with compulsory education only. This resulted in the following design for the explanatory variables:

Social background (2) x Intelligence (3) x Education (7) = 42 cells

The design was repeated for men and women separately. We have questionnaire responses from 2011 men and 1917 women which means an average cell size of 47 for the three explanatory variables in combination, ranging from 0 in three cells to 100 or more in eight cells.

The questionnaire responses form the dependent variable, one at a time. Most questions had preformulated responses with up to five categories. These have been dichotomized near the median in a "high" and a "low" response category. Thus we have four categoric variables in each analysis - three explanatory variables and one dependent.

The statistical method used was log-linear analysis of categoric data. The method tests for partial associations between each of the explanatory variables and the dependent variable. In the following presentation of results the significant associations ($p \leq .05$) are described in a simplified way by means of average percentages of "high" responses in different categories of the explanatory variables.

The questionnaire study was followed by personal interviews in 1982-83 with a sub-sample of about 250 persons in the specially selected group just described and 250 persons from the higher education sample. In the specially selected group from lower socioeconomic strata some of the 2 x 42 cells were excluded and only 2 x 12 cells used with about 10 persons in each. In the present report some quantitative linguistic data will be presented from the interviews. The statistical method used in this case was three-ways analysis of variance.

Results from the questionnaire study

The questionnaire covered a rather broad spectrum of the persons present situation, activities, attitudes, values and self-concept. The questions can be sorted into five main areas:

- Education
- Occupation and working conditions
- Spare time activities
- Social contacts
- Confidence in own ability and competence

On the other hand, it was not possible within a mail questionnaire to include formal tests of cognitive skills or knowledge. The answers to some open questions can be analyzed from a linguistic point of view, but the major source of such information is found in the personal interviews. I should also like to refer to two earlier studies of relative changes in intelligence from 13 to 18 years of age as related to education and occupation which have been done within the longitudinal project (Härnqvist, 1968 and Balke-Aurell, 1982). These changes can be seen as long-term effects of education as well.

Each area had a number of main questions with items to respond to within each. Altogether 125 items for men and 123 items for women have been used as dependent variables and analyzed in relation to the three explanatory variables. Out of the 248 analyses 71 % have shown significant partial associations with educational level, 30 % with intelligence, and 20 % with social background. In comparing these percentages it should be observed that education is the only variable that has been studied in its full length. Both intelligence and social background were curtailed as described above and are thus less likely to show strong associations with the dependent variable.

Before going into detailed examples I should like to stress the pervasiveness of the variable educational level. Responses in all areas are associated with education - sometimes most likely through direct influence from learning in the educational system, but very often as an indirect effect of education on life-chances in general - the occupational and social context which education gives entry to. So far only preliminary analyses have been made with characteristics of the context outside education as additional explanatory variables. Path analyses with more explanatory variables ordered in a time sequence are planned in the sub-sample of 15th born, and some exploratory analyses have been run that look promising.

Education Most questions in this area asked for additional facts about the person´s education. But there are also some

attitudinal questions and the first two examples deal with such. In figure 2 we have a case where the dependent variable has significant partial associations with educational level and intelligence at the same time and in the same direction. The higher level the better satisfaction with school. Education is coded from 1 (Elementary) to 7 (College and university). Intelligence is coded Low (4-5), Medium (6-7) and High (8-9). At the high intelligence level the cell frequencies for lower educational levels (1-5) were too small for reporting percentages, but they have been part of the log-linear analysis.

Figure 2

In Figure 3 we have an example of associations in the negative direction with both intelligence and education. Those at lower levels more often demanded more education for the younger generation than they obtained themselves, and this holds not only for English as in the example but for most academic subjects, with the exception of history and civic education where the association with education is positive.

Figure 3

In both examples the results may look rather trivial. The better students liked school more and continued their education Early school leavers with little theoretical knowledge demanded more education for the new generation. But early leavers might as well have devalued the academic subjects. And when comparing persons with different amounts of education, the more educated persons have often been found to be more critical and less satisfied. This was not the case here in a retrospective question covering very different experiences for different persons.

Occupation and working conditions The participants rated ten characteristics of their jobs. Figure 4 shows one example of a positive and one of a negative relation with education. The higher levels more often described their job as one providing them with new knowledge. The lower levels less often needed to think of the job in their spare time. These relations are likely to be an indirect effect of education - higher education preparing for jobs that are more stimulating and demanding than average.

Figure 4

In another question about work we found that those with more education reported that they had more influence on their own working conditions.

Spare time activities "Cultural" activities such as reading literature, going to theaters and concerts were more frequent activities among the better educated respondents as shown in Figure 5. "Entertainment" through weekly magazines, television and sport events, on the other hand, was negatively correlated with educational level.

Figure 5

Here both direct and indirect effects of education are possible. Direct in the form of cultural education, indirect through the differences in habits and norms that exist in the social environments to which education and occupation lead..

Social contacts with family and relatives were more frequent at lower educational levels and contacts with fellows on the jobs among the more educated. Both social habits and differences in mobility can explain these associations with education.

Confidence in own ability and competence was studied for three different areas: practical tasks mainly in the home, "civic skills" in relation to societal resources and regulations, and linguistic skills. In the first two areas the relations with education varied between positive and negative depending on the character of the task. For instance, educated men reported higher skills in cooking and lower in repairing the car (Figure 6); better information about how to appeal a decision and less about seeking economic support from society.

Figure 6

Twelve aspects of linguistic competence were all positively related to level of education - stronger for English than Swedish language, stronger for reading and writing than for speaking and listening. Also intelligence and social background had partial associations with several aspects. Here I exemplify one situation where men are more confident in their ability: Speaking in the discussion at a club meeting (Figure 7). And one where women rated themselves higher: Writing letter in English to a friend (Figure 8). A similar sex difference was found in other items on speaking and writing, but not for reading and listening.

Figure 7 and Figure 8

Results from the personal interviews

The personal interviews had two purposes:

- to complement and deepen the information about education and

occupation from the questionnaire study,
- to provide a basis for analyses of linguistic skills and concept formation as a counterpart to the self-rated confidence.

The interview had a set of initial questions for each area, but after these it was conducted in a semi-structured way. The entire interview was taped and recorded word for word for computer analysis. So far we have only studied the length and vocabulary of the interviewee's responses, but the data are well suited for both qualitative analyses of the spoken language and studies of the contents.

On average the interviews took 55-60 minutes and produced "texts" of about 4000 words, distributed over 400 words used just once and 300 words used twice or more. The total number of words had a standard deviation of 1400 with extreme cases under 2000 and around 10000.

In Figure 9 four quantitative indices from the interviews are related to sex and educational level. The levels are here condensed into three: Low = 1-2 in the earlier scale, Medium = 4, and High = 6-7. Levels 3 and 5 were omitted in the interview design. Each mean is based on about 40 individuals. For comparative purposes the scales of the variables have been transformed to deviations from the total mean expressed in units of the average within-cell standard deviation.

Figure 9

Men used more words than women, more different words, and proportionately more long words. This third variable also was the one that discriminated most strongly between educational levels, followed by the number of different words while the length of the interview varied rather little between levels. The fourth variable indirectly records the amount of interviewer activity that was needed in the interview. On average the interviewer intervened 100 times (S.D. = 25), and more so on lower than on higher educational levels. This means longer sequences of unprompted speech among the educated persons, and among men than among women since there are no systematic differences between them in the number of interviewer interventions.

These results from the linguistic analyses are very preliminary and crude, but it seems to me that they indicate the value of this data base for further studies of spoken language, especially since the findings can be related not only to the basic background variables used so far but to a wealth of longitudinal information.

Discussion

The study that I now have briefly described started from a model of the sorting and learning processes within the educational system and similar influences from the world outside education. In order to attribute differences among adults to long-term effects of education initial differences and outside influences should be kept under control. In this study, initial differences have been controlled only by means of a couple of background variables, although such as normally explain a large amount of educational variance. This control can be improved through introducing more variables which are available, but only to a certain extent since a non-experimental study never can cover all initial differences between treatment groups. Outside influences have been postulated but so far not analyzed empirically. Furthermore the results have been restricted to the lower socioeconomic strata for reasons explained, and there education might be a more important vehicle for status attainment in society than in the strata where the parent generation already has arrived at a certain level. And finally, the educational effects that remain cannot be related to specific characteristics or events in the educational process but they are global and comprehensive and they cover so far very little of objective aspects of knowledge and skills.

In spite of these shortcomings, inherent in the present approach I maintain that the study has given a lot of interesting results. The main one is the pervasive direct or indirect influence of education on the life situation of the adult, an influence that we as educators may take for granted but seldom specify and verify. And this brings me finally to the theme of this conference, Equality, Equity and Excellence, and its contribution to the evaluation of these goals. I have tried to broaden the aspects that should be considered in evaluating educational systems by

including both a longer time span and a wider spectrum than usual. In that perspective equality of education becomes even more important since it has an impact not only on a specified set of school-related skills and competencies but on life-chances in general.

Note This research was supported by the Bank of Sweden Tercentenary Foundation and the National Board of Universities and Colleges. The longitudinal data base was established in cooperation with the National Board of Statistics and supported by the National Board of Education.

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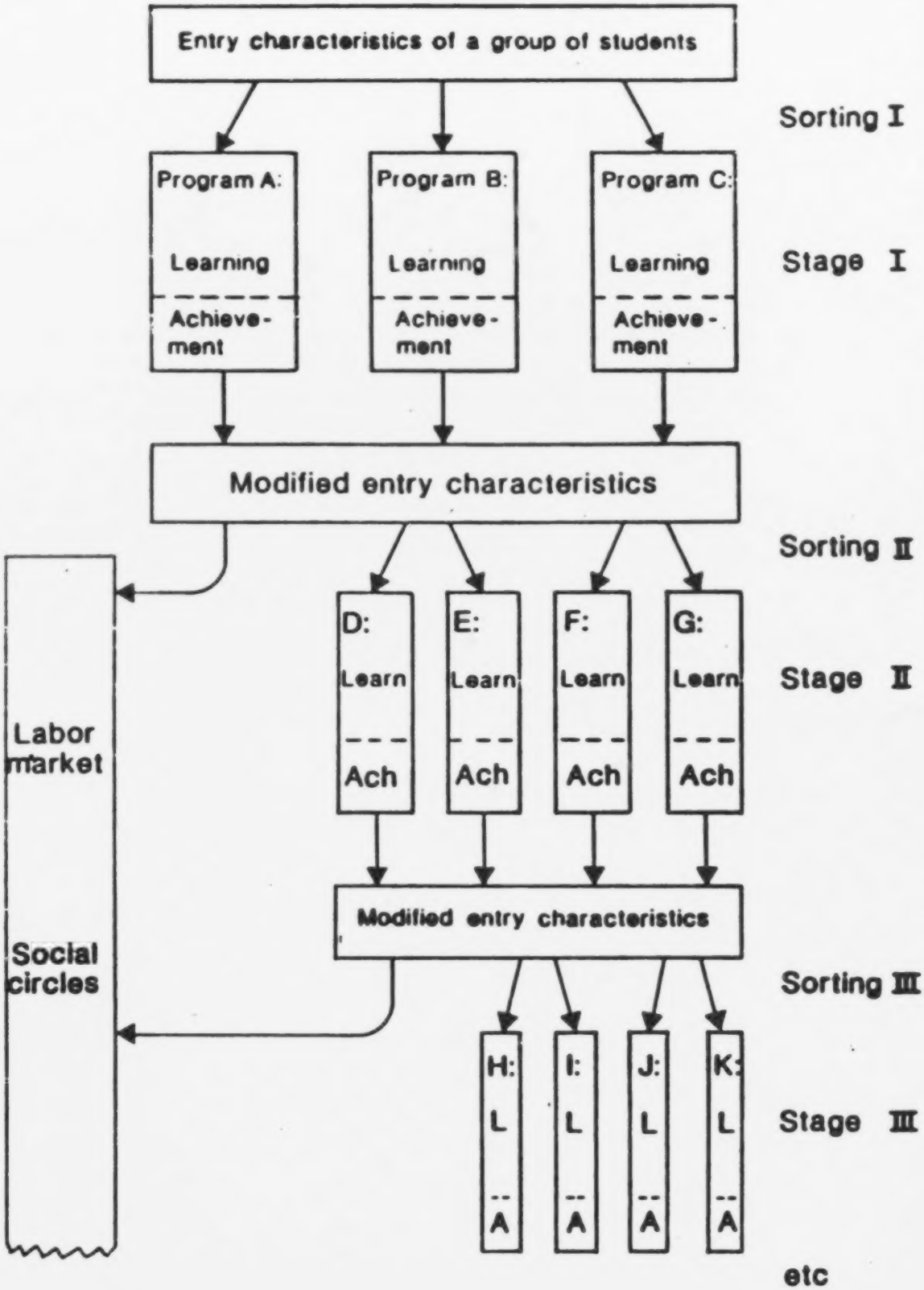
Figure 1. Model of the educational system



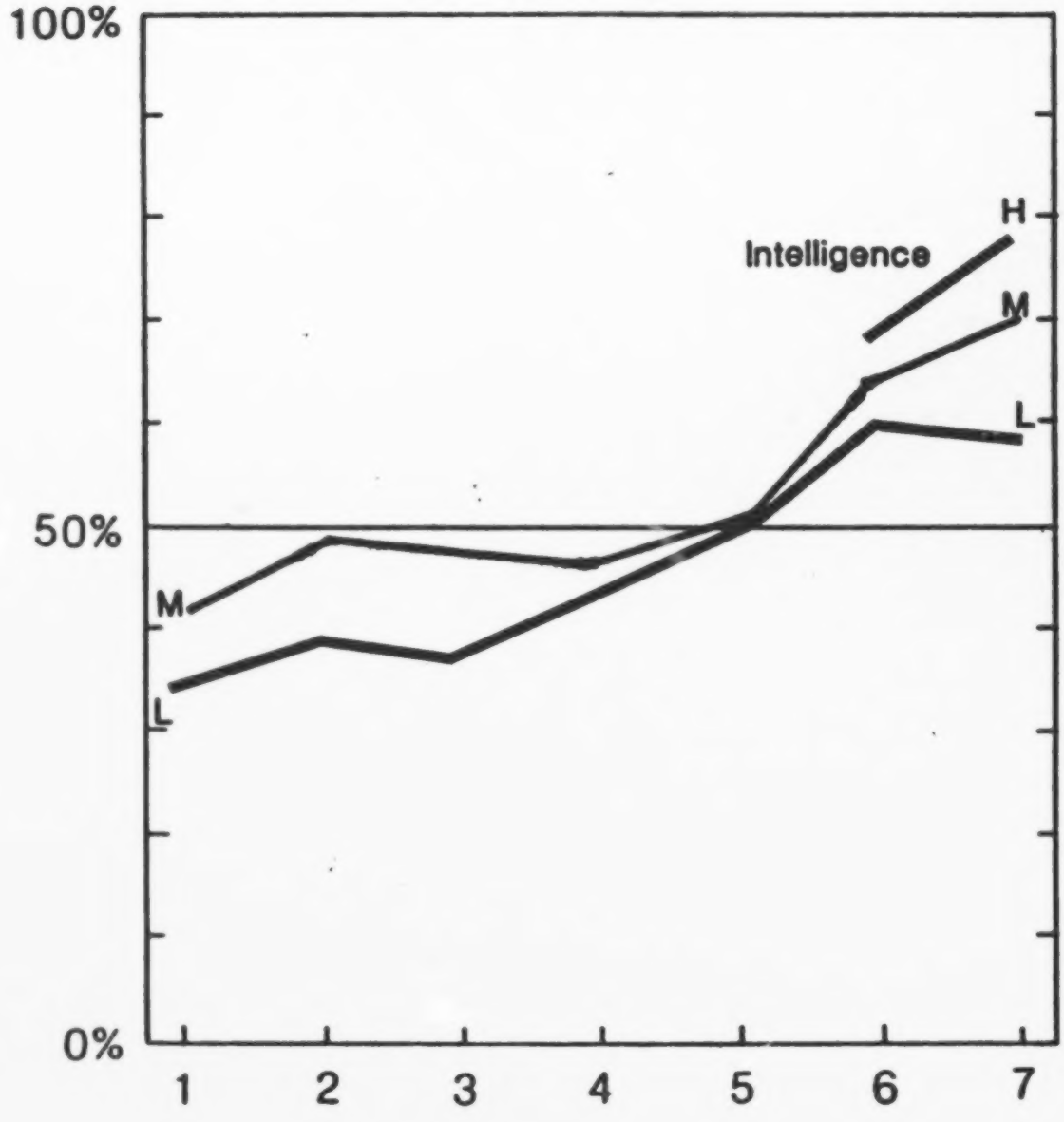


Figure 2 Satisfaction with school, related to education and intelligence (men and women together)

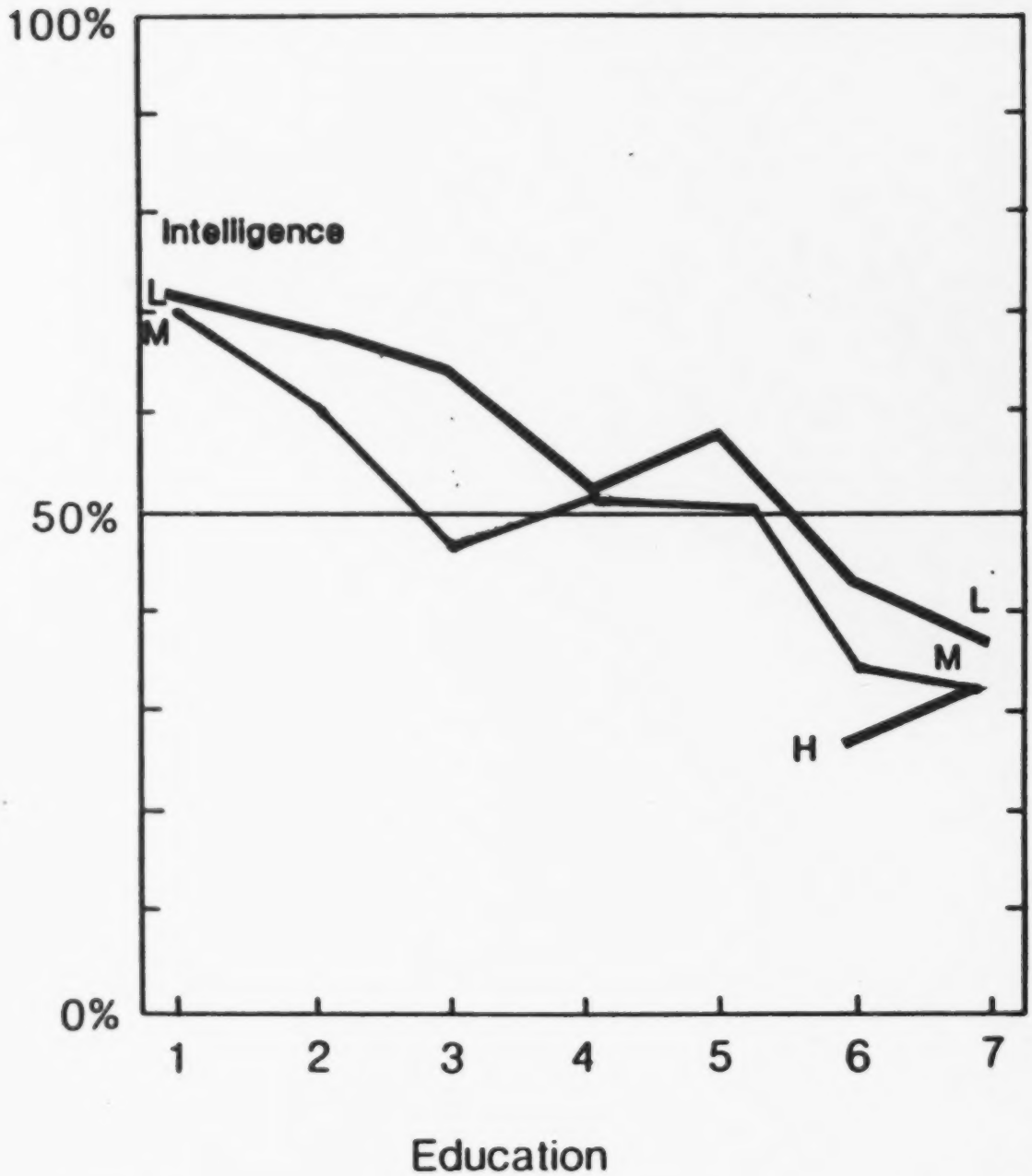


Figure 3 More English needed in school nowadays, related to education and intelligence (women)

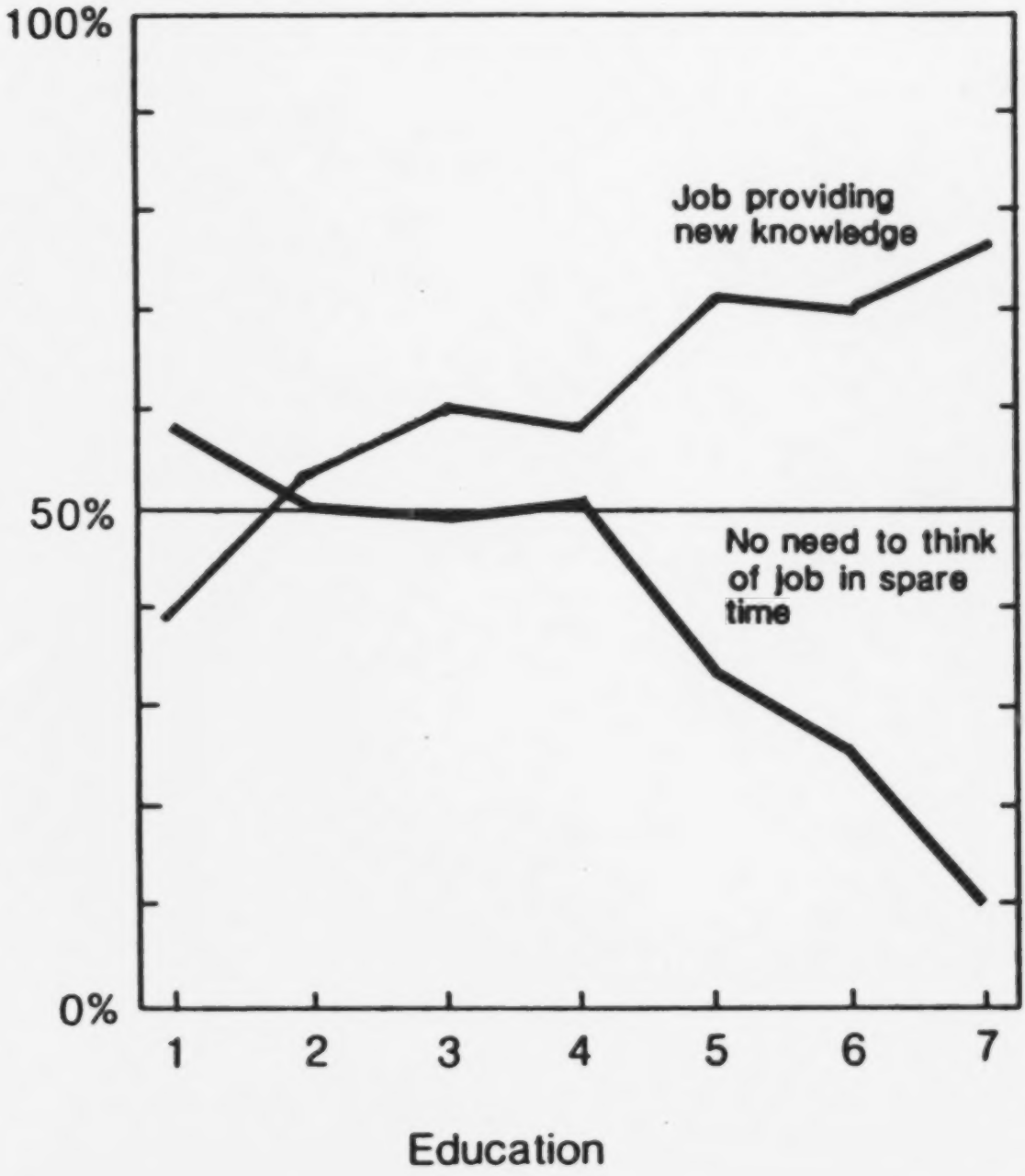


Figure 4 Working conditions, in relation to education (men and women together)

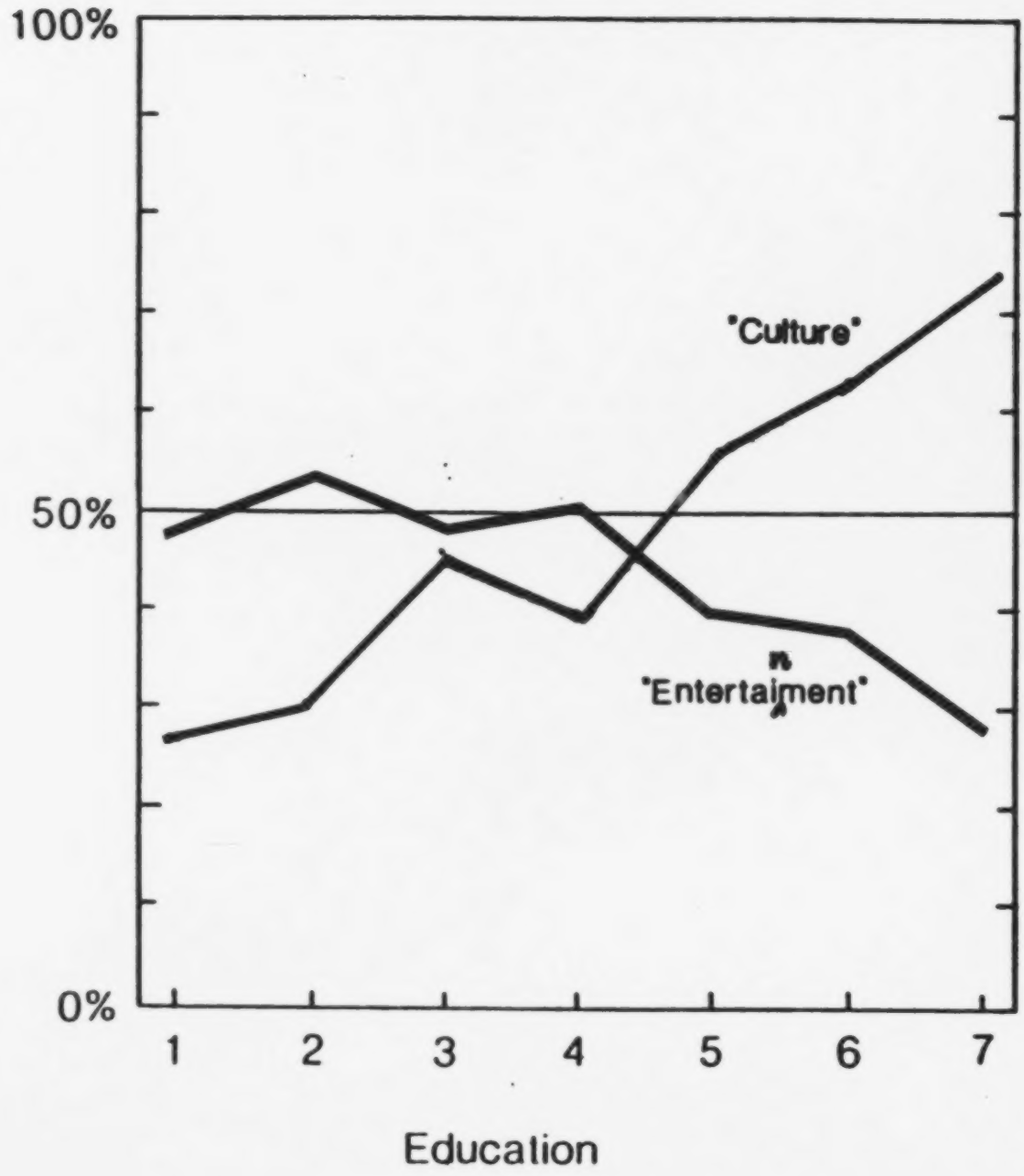


Figure 5 Literature, theater and concerts ("Culture") and Weekly magazines, television and sport events ("Entertainment"), related to education (women)

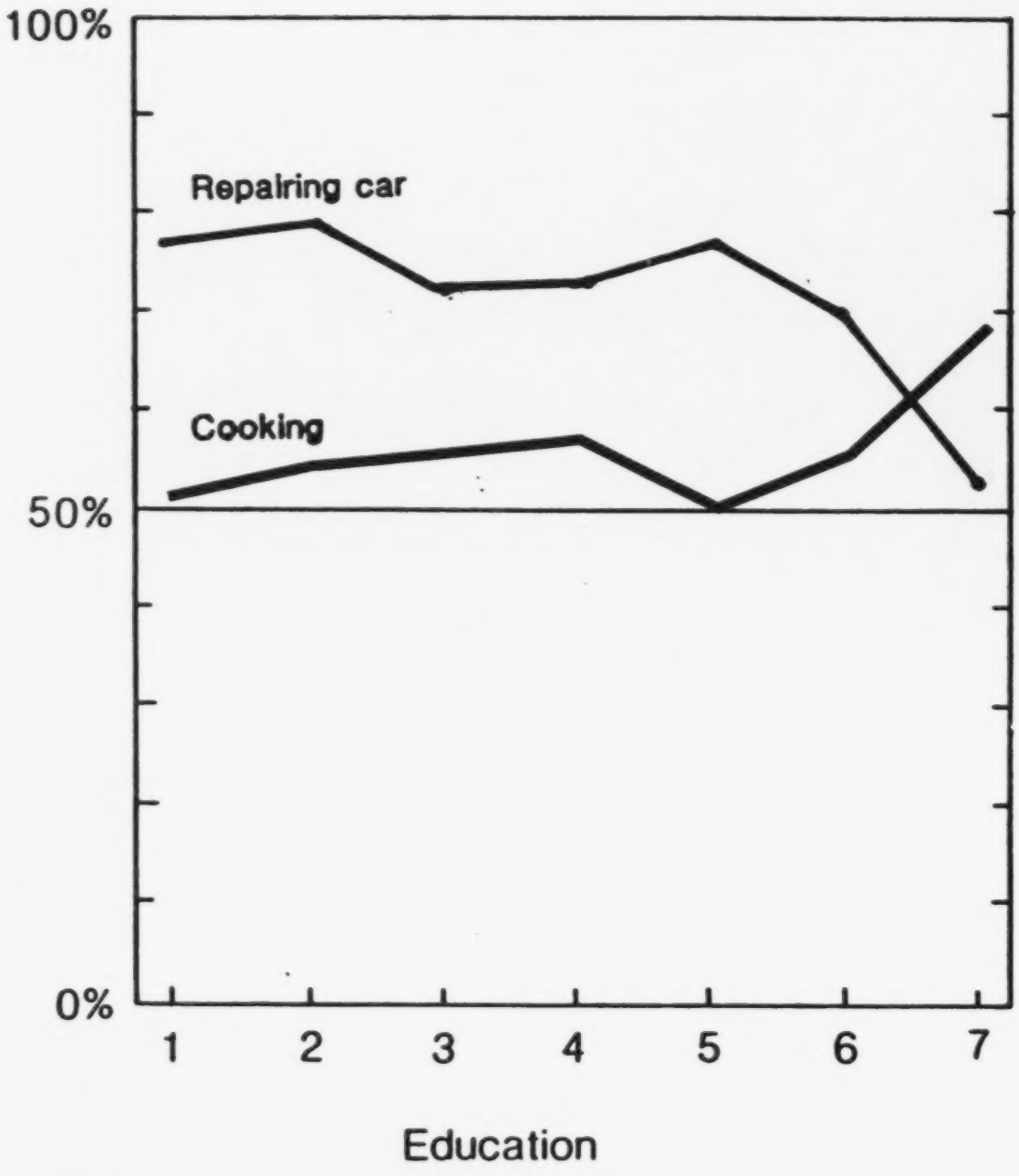


Figure 6 Practical skills, related to education (men)

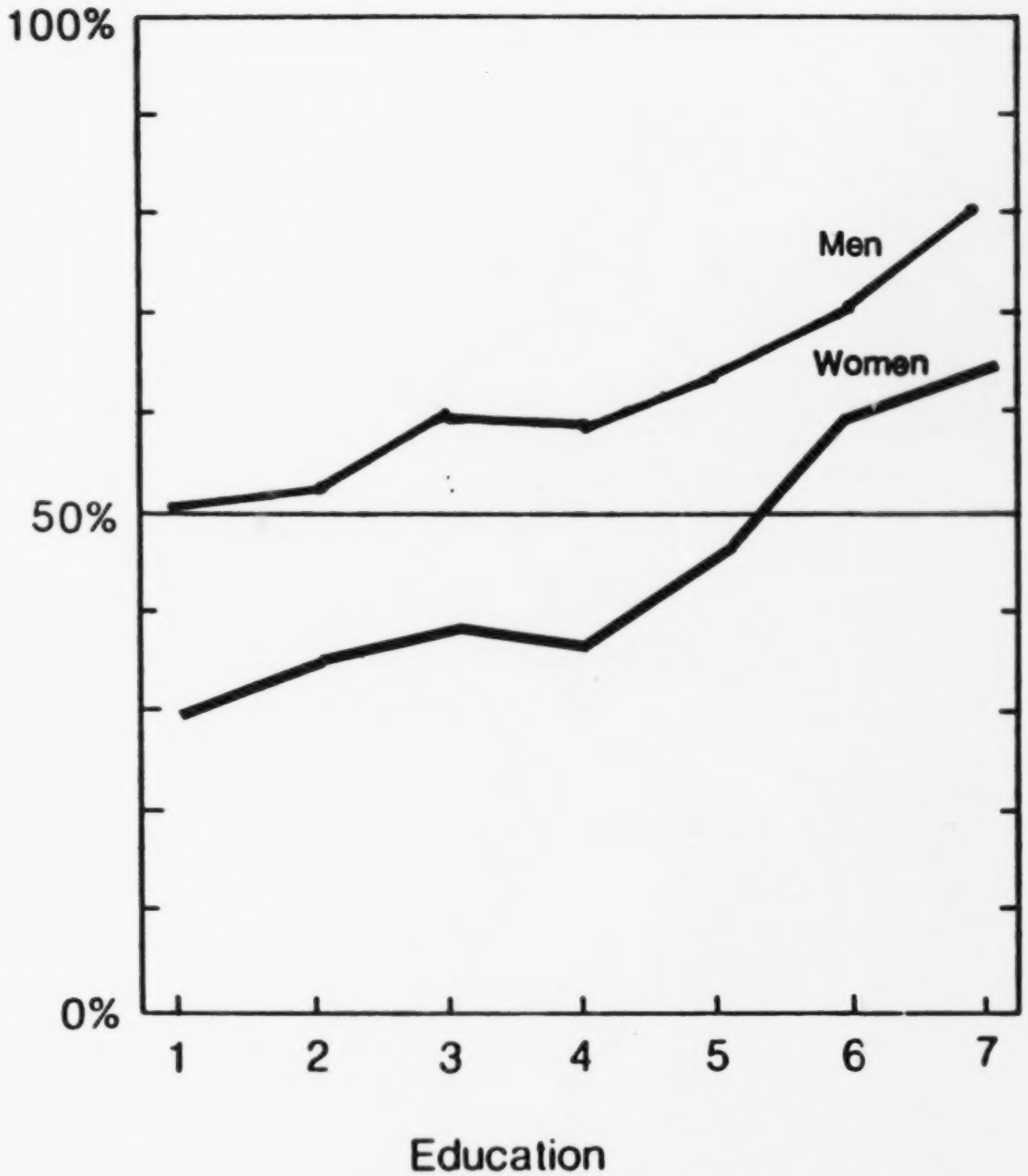


Figure 7 Speaking in the discussion at a club meeting, related to education (men and women separately)

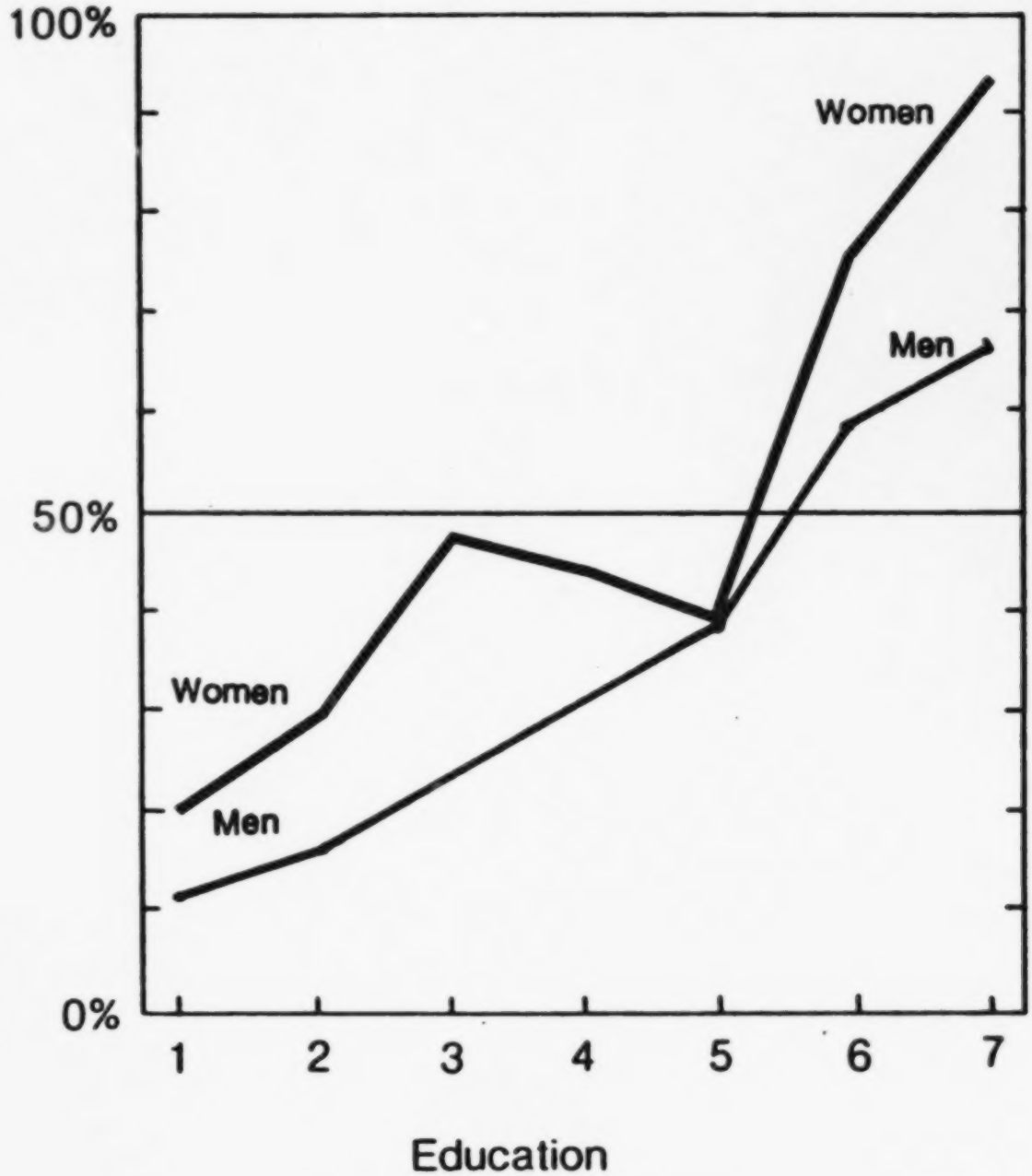


Figure 8 Writing letter in English to a friend, related to education (men and women separately)

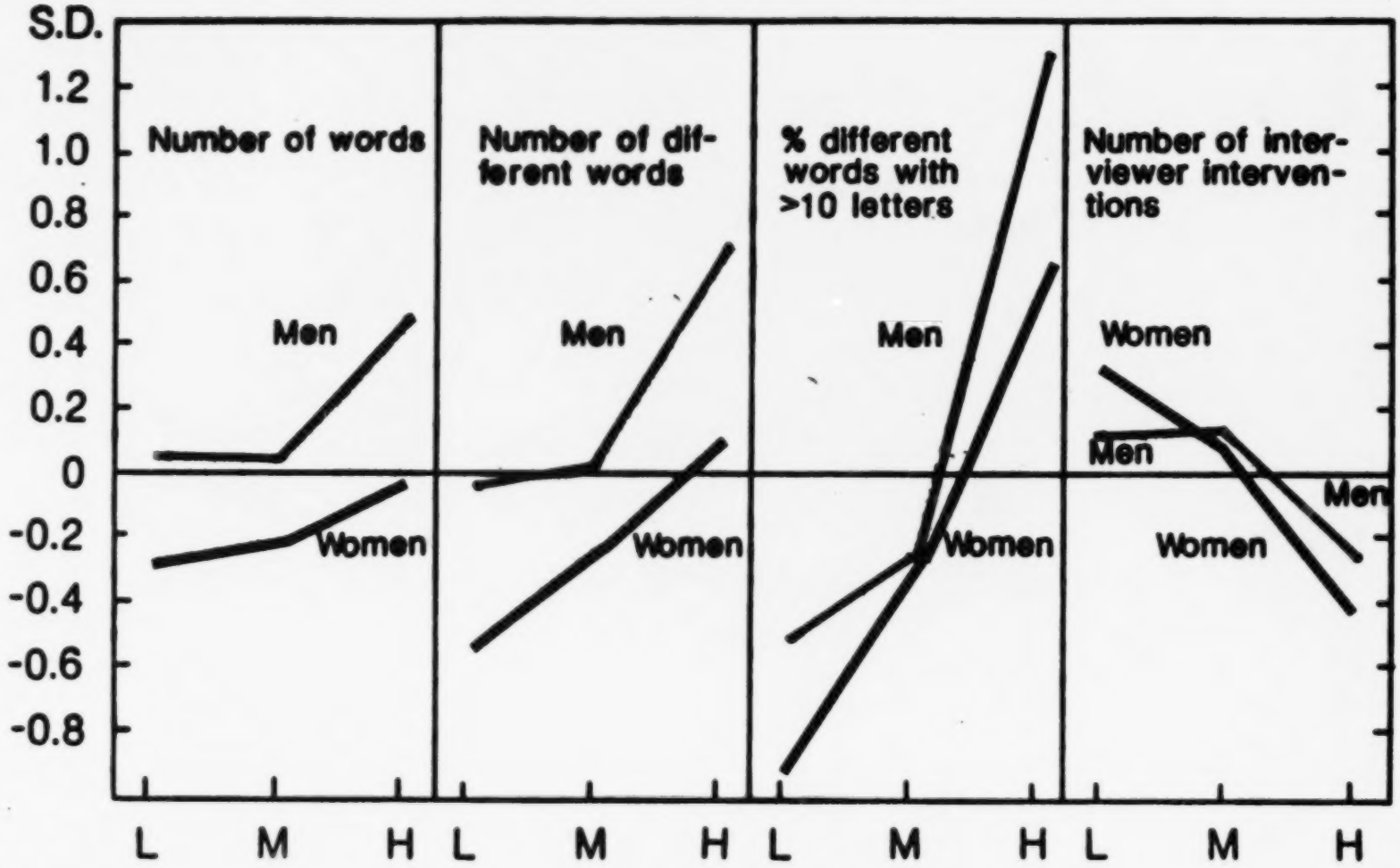


Figure 9 Quantitative measures of speech in interviews, related to education (men and women separately)